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Progressive Retinal Atrophy in Dogs

1. The Disease in Irish Setters (Red)

By

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A syndrome of defective vision in dogs, first apparent at night or at dusk and progressing slowly to severe defects of day vision, has been known for nearly half a century (Magnusson, 1911). The condition has been the subject of a note in this journal recently (Anon., 1947). However, in view of the general interest which has followed the recent legislation by the Kennel Club on the registration of animals suspected of suffering from hereditary disease, it seemed desirable to set out more fully the present state of our knowledge. This paper must be considered only as a preliminary account, as our investigations are as yet far from complete.

Historical Introduction

Magnusson (1911) was the first to record the disease in six Gordon Setters in Sweden which were all closely related to a dog "Ranger," which had been imported from Britain. Magnusson demonstrated in histological preparations that retinal atrophy was present and there seems little doubt that he was dealing with a syndrome similar in most respects to that prevalent among Irish Setters (Red) in Britain to-day. It is of interest that Magnusson considered that the condition was hereditary and that the imported Gordon Setter "Ranger," which itself was unaffected, had introduced the factor into Sweden; from his breeding data this is entirely possible (Gray, 1925).

The disease has not been widely recognised in Britain until more recently (Gray, 1925), although it has been known to breeders of Irish Setters (Red) for some years, and it is in this breed that the condition is most prevalent. From the breed records it seems likely that the disease first became prevalent in the late 1920's following extensive line- and in-breeding to a famous dog, which was a "carrier" of the genetic factor for the condition, although unaffected itself.

The earliest signs of the complaint are usually recognised by breeders with experience of the disease when their animals are six to eight weeks old. At that time affected pups may show in dim lights an increased reflection from the tapetum which appears green rather than the usual yellow-orange-green colour. At this time vision by day and at dusk is normal, although sight on a dark night may be impaired.

Over the succeeding period of a few months to several years there is a gradual loss of vision in dim lights until the animal appears to be completely night blind and eventually becomes day blind as well. Breeders state that the progress of the disease is accelerated by "distemper" and by pregnancy and parturition, especially if the latter is difficult or prolonged. Furthermore, in many afflicted Setter families disturbances of the sexual cycle are said to be more prevalent than in unaffected families. The dogs tend to be infertile and the incidence of mono- or crypt- orchidism is unusually high. The bitches may be late coming into their first oestrus and the oestral periods are often irregular.

We have carried out over 100 detailed examinations of some 50 affected animals and 25 similar examinations of twelve unaffected animals; these form the basis of the following account of the clinical syndrome.

THE CLINICAL SYNDROME

1. General Examination of the Eye

The earliest and most conspicuous signs are an increase in the average pupil size, increased tapetal reflectivity and defective vision at night.

When looked at over the closed lower half of the door of a box stall, the eyes of affected dogs have abnormally dilated pupils. In bright light the pupils of dogs in the early stages of the disease contract quickly to a diameter of 2 to 3 mm. but in moderate or dull light the pupils are three quarters or more dilated and the iris may be only 1 to 2 mm. wide. As the visual defect progresses the pupillary light reflex becomes sluggish and the pupils become dilated in intensities of light formerly causing a normal constriction reaction. The two pupils are equal throughout the disease.

In the dim lights causing dilatation of the pupil there is an increased reflection from the tapetum which is green rather than a yellow-orange-green colour. This enhanced reflectivity of the tapetum remains a marked feature of the disease until it reaches its most advanced stage.

The tests for defective night vision (so-called night blindness) are best carried out as dusk passes into night. The suspected, and if possible, a normal animal are placed in a runway in which small drab coloured obstacles free of strong smell, such as boxes or blocks of wood, are placed in positions they do not normally occupy. As darkness descends the affected animal will be seen to knock against these obstacles, which the animal with normal vision will avoid. Slight degrees of night blindness may be difficult to detect, unless adequate precautions are taken, namely, the dogs should be on a diet containing adequate vitamin A, their eyes should be allowed to become dark adapted by keeping them in a dark place for 15 minutes before the test, and the animal should not be able to detect the obstacles by smell or previous knowledge of their position. Animals which have been night blind for long become very canny; usually they refuse to move about, but when they do their ears are cocked alertly and they are continually sniffing (*i.e.*, searching for olfactory clues to their immediate external environment). They often develop a high stepping gait which is commonly associated with defective vision.

Vision in brighter illuminations, such as artificial light and daylight, is not impaired until an advanced stage of the disease, which may occur several months to several years after the defective night vision is well marked. The eye preservation reflex is lost early in dim light, but in daylight it is absent only when day vision is markedly defective. Even at this stage the direct and consensual pupillary light reflexes are still present when elicited by light-dark or dark-light stimuli. Absence of the pupillary light reflexes occurs only at a very late stage of the disease and to date we have seen only one case showing this sign.

The orbit and adnexa show no signs of disease. There is no increase of intra-ocular pressure as assessed by digital pressure. The cornea, the anterior chamber and iris are normal. The lens is generally unaffected, but in a proportion of animals cataracts develop. These may appear as early as four months after birth when they are seen as anterior subcapsular opacities of 2 to 3 mm. diameter and 1 mm. thick; by the use of the ophthalmoscope the margins of these opacities can be seen to be irregular and to extend into the surrounding lens tissue. They may be unilateral or bilateral. The extension of these cataracts is slow, but in some animals a diffuse nuclear opacity, often denser on certain radial lines, is well marked by two years of age. The vitreous body usually is unaffected; rarely local changes in transparency occur, which appear as transparent bubbles or gossamer-fine threads.

The principal and characteristic lesion is in the fundus, where the retina, chorioid and optic nerve head show signs which, on ophthalmoscopic examination, are seen clearly in advanced cases of the disease. Before considering these signs in more detail, a brief description of the normal fundus of the Irish Setter (Red) may be of assistance.

2. Ophthalmoscopic Examination of the Fundus of the Irish Setter (Red)

(*a*) The Normal Fundus (see Fig. 1)

The fundus of the domestic dog shows great variation and the following description is based on the examination of a small series of Red Irish Setters, and will not necessarily apply to other breeds.

DIAGRAMS TO ILLUSTRATE THE ANATOMY OF THE FUNDUS

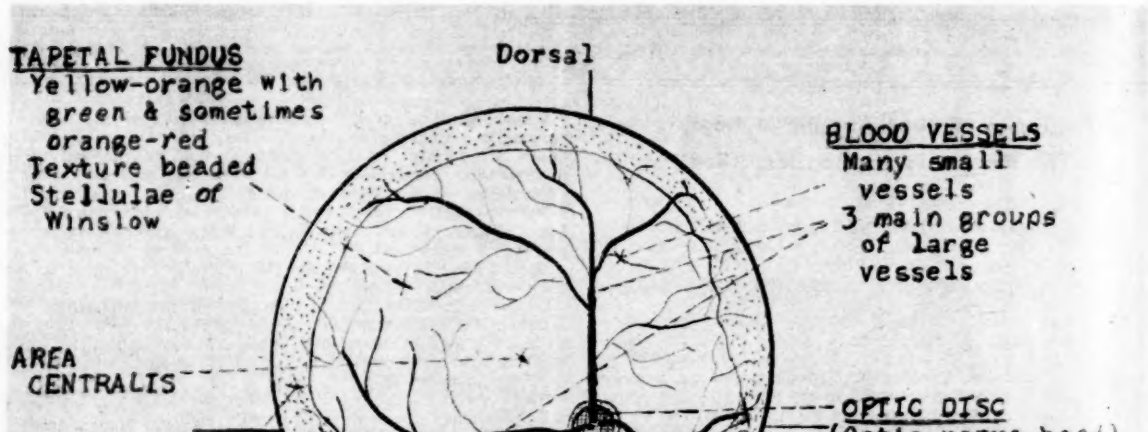


Fig. 1.—Left eye of a normal Irish Setter.

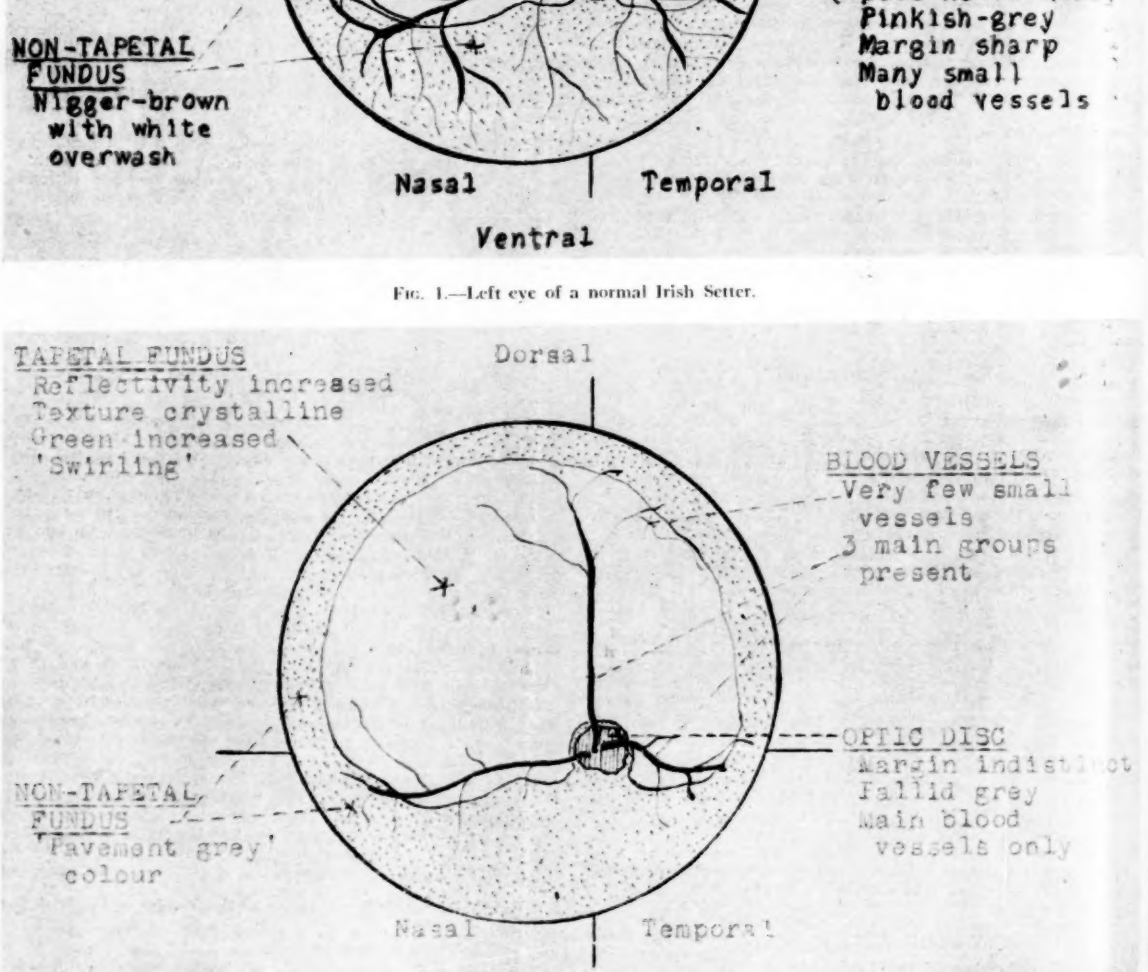


Fig. 2.—Left eye of an affected (stage 3) Setter.

The fundus may be divided conveniently into two portions, a dorsal segment containing the tapetum lucidum, the tapetal fundus, and a ventral segment (without the tapetum lucidum), the non-tapetal fundus. At the junction of the two segments but slightly posterior to the optical axis the optic nerve pierces the fundus as the optic disc, through which the retinal blood vessels enter. The position of the disc relative to the tapetal fundus is inconstant but usually the disc, which is round or nearly so, with a well-defined margin, lies just within the ventral border of the latter.

The tapetal fundus exhibits a very brightly coloured reflectivity due to the tapetum lucidum of the chorioid, which is responsible for the coloured reflection shown by dogs' eyes.

The colour of the tapetum varies markedly with age and genetic constitution. In the young sucking puppy it is a homogeneous dove-grey colour with very slight beading. In the dog two months old and upwards it is usually a yellow-orange colour with a very subdued green component; some have a strong orange-red component, giving a total effect of redness, while others are lemon with very little green. The tapetum is continuous except for a very fine reticulum of dark spaces, the stellulae of Winslow; its texture is uneven and may be described as one of granular beading (not dissimilar to the beading of certain photographic "daylight" projection screens). This beading is fine over the area centralis, but becomes coarser towards the periphery. At its margins the tapetal fundus is non-continuous and a coarse reticulum of dark pigmented non-tapetal fundus appears. A similar pigmented reticulum may occur around the optic disc for an "apparent" width* of some 2 to 3 mm. This intermediary zone between the two segments is often more green than the remainder and the texture crystalline rather than granular.

The tissues overlying the tapetum are homogeneously transparent. On their outer surface course the retinal blood vessels. The tapetal fundus has a single main group of large vein and two or three smaller arteries which run dorsally from the disc and from which small collateral branches stem, although these branches are not numerous until the peripheral portion of the tapetal fundus is reached. They are almost absent over the area centralis, which lies medial and slightly dorsal to the disc. The blood vessels of the tapetal fundus show no longitudinal "silver wire" reflection from their surface.

The non-tapetal fundus is predominately a deep nigger brown with a light white over-wash, which imparts a slight greyish tone to the nigger brown. It is essentially homogeneous, although a very fine granular structure can be made out occasionally. The blood vessels usually arise in two groups of vein and artery in the ventral temporal and nasal quadrants of the disc. They course over the non-tapetal fundus and form a denser network than the tapetal vessels. In addition they exhibit a "silver wire" reflection, *i.e.*, from their outer longitudinal surface a white line appears on both arteries and veins, the width being regular and about one third that of the vessel. As the vessel passes into the tapetal fundus this "silver wire" appearance disappears gradually over an "apparent" distance of 1 cm.

The disc is round or slightly oval, densely opaque and a pinkish-white colour. It is always surrounded by a narrow zone of non-tapetal fundus. The peripheral margin of the disc is distinct, slightly irregular and without striations. Towards the centre of the disc is a small oval or circular area, which in shadow appears darker and whose centre is beyond the focal plane of the main portion. This is the physiological cup, which is usually present although in many animals it is inconspicuous. From the peripheral margins of this cup the retinal vein emerges usually from a single exit, occasionally from two or more points, one of which may be more towards the periphery of the disc. The main vein commonly forms a semi-circular trunk, passing over one third or half of the disc and sometimes rejoining the parent vessel to form a venous circuit. From this semi-circular venous trunk arise the three main veins of the retina, although one or more branches may arise independently.

The numerous arteries of the retina arise peripheral to the veins as a rule. The arteries are about one-third the diameter of the veins and course directly outwards over the disc; they number eight to ten. In addition, in the peripheral third of the disc it is not unusual to observe three or four arteries emerging, some of which loop on the surface of the disc and re-enter its substance without sending out any branches to the retina.

Between these main blood vessels there is a fine network of smaller vessels, which give to the substance of the disc its pink colour. The diameter of these vessels follows rather closely the vasomotor tone of the peripheral, and possibly the meningeal and cerebral, circulations, so that in conditions of generalised peripheral vasodilatation, the substance of the disc may become a suffused brick-red colour. Conversely, in conditions of generalised peripheral vasoconstriction, *e.g.*, when an animal is wet and cold, the disc may appear greyish-white.

Where the blood vessels pass from the disc to the fundus their diameter may appear to be reduced slightly, but the surface of the vessel remains in the same plane of focus.

(*b*) The Fundus of the Affected Eye (see Fig. 2)

The changes in the fundi of the affected eyes can be described conveniently in three stages.

Stage 1, which is associated with increased average pupil size and an increased green tapetal reflection, with slight defective night vision, *i.e.*, apparent blindness on a dark moonless night, shows little or no change in the blood vessels of the retina and disc. There is a loss of the granular beading of the tapetum, which becomes more highly reflective and the green colour component becomes more prominent, especially immediately around the disc and at the periphery of the tapetal fundus. The homogeneity of the tissue overlying the tapetum is modified slightly, so that a "swirling" effect occurs due to changes of refraction without loss of transparency; this "swirling" may be likened to fine gossamer threads superimposed on the retinal surface. The colour of the non-tapetal fundus is very slightly more grey than normal.

Stage 2 is characterised by visual powers which are markedly defective at dusk or in dim illuminations. The green tapetal reflectivity is apparent in bright as well as dim illuminations. There are more marked changes in the tapetum as well as initial changes in the vascular system.

The tapetum in many cases now shows a marked green colour component, which begins to suppress the yellow and orange components. Its texture is markedly changed; the granular beading is absent and in its place is a more highly reflective texture resembling large rhomboidal crystals, while the fine dark reticulum, the stellulae of Winslow, is less prominent. This texture may be termed "crystalline." The "swirling" of the supra-tapetal tissue is more marked and the non-tapetal fundus now shows a definite homogeneous greying of the surface.

The main branches of the arteries and veins show little change: the alterations are confined to the smaller vessels. These are much less frequent over the tapetal fundus and the disc; the latter as a result appears more pallid than normal in its peripheral portions. The smaller branches of the vessels of the non-tapetal fundus are less numerous and a number of the larger arteries tend to disappear abruptly by passing within the pigment layer of the chorioid.

Stage 3 represents the final stage of the disease. The fundus changes are well defined, night vision is apparently absent and day vision grossly impaired.

The disc is now almost white and its margin ragged and irregular; the three to four main groups of blood vessels are still present but reduced in size and the smaller vessels have disappeared. The tapetum shows markedly increased reflectivity with a crystalline texture, although in some cases with grossly defective day vision of long standing this enhanced tapetal reflectivity disappears. The blood vessels of the fundus are scanty and only the three main groups and their larger collaterals can be seen. The non-tapetal fundus has a grey sheen, so that the whole has a "pavement grey" appearance.

In very advanced cases further changes may be observed. The tapetal fundus appears its usual colour in the centre of the ophthalmoscope light beam, but at the periphery of the illuminated area the fundus appears an increasingly cloudy white; this whiteness disappears as soon as the centre of the light beam is directed on to the part. Over the non-tapetal fundus the "pavement greyness" becomes uneven; the greyness is enhanced along the previous course of the main blood vessels and in patches about 5 mm. across, of irregular outline but fairly well demarcated. In other places small irregularly oval dark brown spots occur, very similar in colour to the original nigger-brown of the non-tapetal fundus, and apparently due to the disappearance of the overlying "pavement greyness."

*It is convenient to describe the dimensions of the fundus as they appear through the ophthalmoscope. The "apparent" width is actually the real width × the magnification given by the ophthalmoscope, which in our instrument is about 15 ×.

3. Histopathology

Our pathological observations are only at a very preliminary stage, but so far they corroborate the findings of Magnusson, who found a primary degeneration of the retina. This degeneration commences in the principal receptor cells, the rods, the receptor processes of which atrophy first without any marked change in their nuclei in the outer nuclear layer. As the disease progresses, disorganisation and atrophy of the outer and inner nuclear layers occurs, followed finally by atrophic changes in the ganglion cell and nerve fibre layers.

4. Rate of Development of the Visual Defect

The rate at which the visual defect develops from one of slightly defective night vision to gross impairment of day vision varies from several months to several years. Some show gross impairment of day vision by one year; others retain some powers of day vision when six or seven years old. The early signs of defective night vision may be present by six to eight weeks, but often it is four to six months before certain signs of this defect may be detected. It is not certain that the rate of development is always the same in both eyes, or that it progresses at a regular rate.

5. Incidence

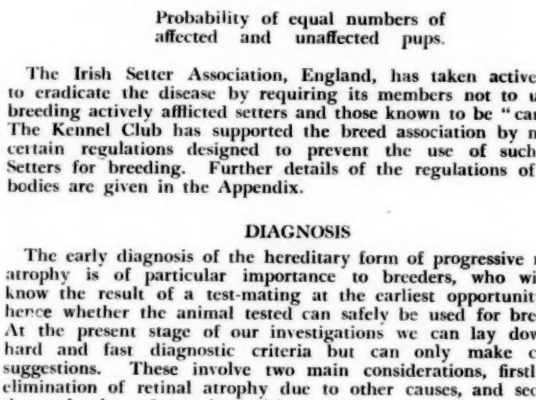
The disease is very widespread amongst Irish Setters (Red) in Great Britain and is known to have occurred in the U.S.A., Australia, France, Holland and Eire in the progeny of dogs imported from the United Kingdom. It is, as far as is known, absent in Norway and Sweden, where an Irish Setter entrant for a Championship Show must first have secured a prize at a Field Trial. In Holland the disease has been recognised for some years.

THE GENETICS OF THE DISEASE

The first known case of the disease among Irish Setters (Red) occurred about 40 years ago. After the First World War a certain strain became used extensively. This strain was affected and when line- or in-breeding to a well-known dog of this strain took place the affection became relatively common. Rasbridge (1944), as a result of experimental breeding, suggested that the condition is hereditary. An analysis of some 200 pedigrees of affected Setters enabled him to determine the animals through which the genetic factor for the disease had been transmitted. It is not confined to either sex and the affliction usually misses one or more generations. The mode of inheritance is almost certainly a simple Mendelian autosomal recessive factor. Let "R" represent the dominant factor for retinal health and "r" its recessive counterpart associated with retinal atrophy. Then three genetic types of animal will occur, the homozygous dominant, "RR," the heterozygous "Rr," and the homozygous recessive, "rr"; the last type is the only one to exhibit the disease. The two types, "RR" and "Rr" are unaffected in their powers of vision, but the heterozygous form carries the retinal atrophy factor, "r," and may be termed a "carrier." The "carrier" animal mated with another "carrier" or with an affected animal will produce a proportion of affected animals; mated to the dominant "RR" animal it will produce no affected progeny, but the chances are that half of them will still be "carriers." Most cases of the disease occur through the mating of two "carriers."

To eradicate the defect from the breed, matings should only be made from animals with the genetic constitution, "RR," *i.e.*, the offspring of homozygous "RR" parents or only those progeny of two heterozygous "Rr" "carriers," which have been shown to be genotypically "RR." The progeny of matings of the heterozygous "carrier" and recessive "case" or of two recessive "cases" should not be used for breeding. The homozygous recessive, the affected animal, can be diagnosed clinically. The problem is to determine whether the animal with apparently normal sight is genotypically "RR" or "Rr." The only satisfactory means of doing this at present is by carrying out a test-mating with a known affected animal. To make the test of any value in establishing freedom from the defect there should be at least six puppies in the litter reared to an age when clinical evidence of the disease, if present, will be evident, in order to allow a reasonable chance, according to the laws of probability and Mendelian inheritance, for one pup to be affected. If none of the pups are cases, then the tested animal is almost certainly genotypically "RR"; if one or more pups are affected then the tested animal is a "carrier," genotypically "Rr."

Possible Test-Matings



The Irish Setter Association, England, has taken active steps to eradicate the disease by requiring its members not to use for breeding actively afflicted setters and those known to be "carriers." The Kennel Club has supported the breed association by making certain regulations designed to prevent the use of such Irish Setters for breeding. Further details of the regulations of these bodies are given in the Appendix.

DIAGNOSIS

The early diagnosis of the hereditary form of progressive retinal atrophy is of particular importance to breeders, who wish to know the result of a test-mating at the earliest opportunity and hence whether the animal tested can safely be used for breeding. At the present stage of our investigations we can lay down no hard and fast diagnostic criteria but can only make certain suggestions. These involve two main considerations, firstly the elimination of retinal atrophy due to other causes, and secondly the evaluation of certain positive criteria.

1. Possible Causes of Progressive Retinal Atrophy

The syndrome of progressive retinal atrophy in the dog has received but little attention, to judge from the scarcity of the published information. However, we have had two cases under observation recently which suggest to us that there may be causes other than the simple hereditary one, rare though they may be.

The first case was an Irish Setter (Red) bitch, two years old, with grossly defective vision of progressive onset, and no history of any other illness. She was assumed to be a case of the hereditary form of the disease and had been used for a test-mating. On examination it was observed that the average pupil size was very large, the pupillary reflexes were absent and in the non-tapetal fundus were numerous whiter areas which may be described as a "chorioidal fundus defect." The fundus also showed the changes seen in early stage three of the hereditary form. However, the question immediately arises whether *all* the fundus changes were associated with another disease, or whether the hereditary form was present together with another disease responsible for the "chorioidal fundus defect," which does not occur in the simple hereditary form. Such a possibility immediately casts doubt on the validity of the results of any test-mating for the simple hereditary form using this bitch.

The second case was a spaniel which showed all the main clinical features of the hereditary form of the complaint, but in addition there was one small area in one eye showing the "chorioidal fundus defect," and the dog suffered from a mild very slowly progressive posterior paraplegia. There was a clear history of distemper in puppyhood. Such a case suggests the possibility that virus infections may occasionally set up a slowly progressive degeneration in the retina as in other parts of the nervous system. The presence of other neurological defects in a case of suspected hereditary retinal atrophy should make one extremely cautious at arriving at a diagnosis without additional information. On the other hand, there is no reason why post-infective neurological defects should not occur in an animal affected primarily with the hereditary retinal atrophy.

2. Criteria of Hereditary Progressive Retinal Atrophy

The diagnosis of hereditary progressive retinal atrophy rests on the careful appraisal of a number of criteria, none of which alone suffices to establish a positive (or negative) diagnosis. These criteria are:

(1) *Increased average pupil size* especially in low illuminations without loss of the pupillary light reflexes until very late in the disease.

(2) *Increased tapetal reflectivity* with usually an enhanced green component.

(3) *Performance tests* for visual powers especially at night or in very low illuminations.

(4) *Ophthalmoscopic examination* of the fundus.

(5) *Appraisal of pedigree* and of the visual powers of related animals.

(6) *Test-mating* with an animal diagnosed by a competent person as being actively affected with the simple hereditary form of the disease only.

A careful appraisal of the first five criteria is essential before arriving at a diagnosis. Even so, in the early stages of the disease the diagnosis may be in doubt. The fundus changes in the late stages are readily discerned, but in Stages 1 and early Stage 2 the clinical assessment of abnormalities requires considerable experience of the condition and we are at present attempting by repeated examinations of many affected animals to establish the early fundus changes which we might consider to be diagnostic.

The performance test for defective night vision is one of the most useful criteria in the early stages of the disease but taken alone it is not diagnostic.

A knowledge of the breeding of an animal and of any known cases of the disease in nearly related individuals serves to establish an *a priori* suspicion that a doubtful case may in time prove to be definitely affected. In Irish Setters (Red) the hereditary form of the complaint is so widespread that any animal showing any of the signs must be considered suspect, until a thorough investigation has been made. In other breeds we have as yet insufficient data to establish whether the condition is hereditary; any information relating to cases in other breeds would be of great value.

Final confirmation of a diagnosis may be obtained by test-mating the suspected animal to a known affected animal of the same breed, preferably of a closely related strain. In a positive case all the progeny of such a mating will be affected, if, as we suspect, a single autosomal recessive factor is responsible.

Such a test-mating is the only way in which to establish or rule out the presence of the disease in certain special cases such as an animal suffering from bilateral diffuse nuclear cataract at the time of examination, since the presence of the cataracts interferes with the evaluation of four of our diagnostic criteria.

DISCUSSION

The condition we have described represents a definite syndrome, but the question of whether one or more aetiological entities are involved is at present under investigation. The cardinal feature of the disease appears to be a progressive atrophy of the sensory processes of the principal receptor cells of the retina followed later by atrophy of their nuclear portions and their neuronal connections within the retina and the optic nerve. Coinciding with this retinal degeneration there is a diminution in the number, calibre and extent of the branches of the retinal artery and vein.

Cataracts of two types have been observed in affected animals, namely an early small focal anterior subcapsular type and a later diffuse nuclear type. The relationship of these two types to each other and to the retinal atrophy is at present obscure, but the frequency with which dogs affected with hereditary progressive retinal atrophy develop these cataracts is so high compared with the usual incidence that some association seems probable. In fact we tend to regard the presence of a small anterior subcapsular cataract in a four- to six-months-old Irish Setter (Red) as being suggestive of the presence of hereditary progressive retinal atrophy.

The dark spots observed in the non-tapetal fundus in the late stage are, as far as we can determine at present, probably due to the intensity of the overlying "pavement greyness" developing at a different rate in various parts of the fundus and in some places allowing the original chorioidal pigment to be seen as dark spots. We have not observed any stellate accumulations of pigment such as occur in retinitis pigmentosa in man, nor any disturbances of metabolism such as are associated with defective vision in the Laurence-Moon-Biedl syndrome in man. We therefore feel that the term retinitis pigmentosa first given to this disease in the dog by Magnusson, and since widely adopted by breeders, is a mis-nomer and serves only to suggest a parallelism between the disease in man and in the dog, which we consider the available evidence does not warrant. We prefer, therefore, to term the disease retinal atrophy.

The hereditary nature of the disease in Irish Setters (Red) has been established. Its principal mode of inheritance is that of a simple autosomal recessive gene; whether other genes are present modifying the action of the principal gene responsible for the somatic life of the retina is at present not known. For the present the system of test-mating instituted by the Irish Setter Association and recognised by the Kennel Club, and the discarding, for breeding purposes, of "carriers" would seem the wisest method of eradicating the gene from the breed. The results from the use of this test-mating will provide valuable evidence as to the presence of possible modifying genes.

The problem of the certain diagnosis of the disease in its earliest stages remains to be solved. Even in the later stages the observations of the clinical signs are by no means easy. The giving of a positive or negative diagnosis should be avoided unless one is well acquainted with canine ophthalmology in general and the disease in particular, since the consequences of a mistaken diagnosis may not be confined to the animal under examination.

The help of veterinarians and dog breeders in elucidating further the problem of blindness in general and retinal atrophy in particular in all animals would be welcomed by the Canine Research Station of the Animal Health Trust.

Summary

1. A syndrome of progressive atrophy of the retina in dogs of the Irish Setter (Red) breed is described.

2. The clinical signs are essentially those of defective vision first at night and later in daylight.

3. The essential lesion is an atrophy of the receptor cells of the retina, with which is associated a reduction of the retinal blood vessels.

4. The syndrome is hereditary and is probably inherited as a simple Mendelian autosomal recessive factor.

5. The problem of diagnosis is discussed.

6. The steps taken by the Irish Setter Association, England, and the Kennel Club to control the disease are outlined.

Acknowledgment.—Professor A. Sorsby, Research Professor in Ophthalmology of the Royal College of Surgeons of England at the Royal Eye Hospital, London, collaborated in certain aspects of this work and will be publishing an account in the medical press. We are indebted to him for his help and certain histological preparations.

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APPENDIX

Irish Setter Association, England

Form of undertaking regarding Congenital Blindness

I undertake as from this date:

(1) Not wittingly to sell or offer for sale without disclosure any Setter suffering from or a proved "carrier" of hereditary blindness or any son or daughter of such afflicted Setters whelped ten weeks or more after the date of this undertaking which has not passed a satisfactory mating test, that is to say unless (*a*) the Setter in question is subsequently mated with one which is actively afflicted and the resulting litter contains at least 6 (six) pups which are reared to an age at which the disease can be diagnosed, and (*b*) none of the litter proves to be actively afflicted.

(2) Not to allow anyone to breed from an actively afflicted Setter or proved "carrier" belonging to me unless he/she gives an undertaking in writing not to sell any of the progeny unless they have passed a satisfactory mating test.

(3) To advise (with details of the pedigree) the Hon. Secretary of the Association for the time being of any actively afflicted Setter purchased by me and of any mating taking place in my kennels, or elsewhere in which Setters belonging to or controlled by me are involved, which produces even a single actively afflicted puppy and to allow him/her, as the agent and officer of the Association, to give to any enquirers information regarding the transmission of the genetic factor for the disease which the production of such a Setter may reveal.

(4) To advise, in writing, the owner of the sire of any actively afflicted Setters which I may breed and the breeder of any actively afflicted Setter which I may purchase of the facts.

By "carrier" in this Undertaking is meant a Setter with normal powers of vision to which the genetic factor for the disease has been transmitted, and I acknowledge that the following shall be regarded as proved "carriers"—the parents and progeny of an actively afflicted Setter and all those ancestors of such a Setter to whom it can be shown, by deduction, that the genetic factor was transmitted.

And I sign this Undertaking the day of , 194 , with a full comprehension of its meaning and significance.

(*Concluded at foot of col.* 1, *p.* 190)

CLINICAL COMMUNICATION

A "Brown Mouth" Syndrome in Dogs

MARION J. FREAK, M.R.C.V.S.

Potter's Bar, Middlesex

Certain aspects of the canine encephalitis cases recently described in your columns by Capt. R. I. C. Hyam, have prompted the following description of a syndrome—resembling in some ways that described by Pugh as "infectious brown mouth" and characterised mainly by gum necrosis, brown slime on the teeth and dysentery—which has been encountered in dogs as a complicating factor in virus disease. It has also been seen in response to lowered resistance *post-partum* and a few cases have shown no apparent reason for lowered resistance.

Incidence

The majority of cases have occurred during outbreaks of canine distemper in kennels, two of the largest being in racing greyhounds and a third in a breeding kennel of Scottish terriers and dachshunds. Sporadic cases have been seen in pet dogs over the period 1945-49, mostly coincident with canine distemper or hard pad disease, but a few showing no obvious signs of virus infection.

Outbreak 1 (racing greyhounds, August to September, 1946) involved seven dogs out of a total of 20. Three further dogs showed canine distemper with respiratory secondary infection but no "brown mouth" symptoms.

Outbreak 2 (racing greyhounds in a different kennel, January to February, 1948) involved 17 dogs out of a total of 29; of these, seven showed other symptoms of canine distemper in addition to "brown mouth" and ten showed only the "brown mouth" symptoms. Three other dogs in this kennel showed canine distemper without "brown mouth."

Outbreak 3 (Scottish terriers and dachshunds, March, 1948) involved three dachshund puppies aged three months and one Scottie five months, out of a total of five adults (three Scotties, two dachshunds) and 13 puppies and occurred towards the end of an outbreak of canine distemper. The Scottie showed canine distemper, the dachshund puppies were in-contacts which had shown no distemper symptoms.

In all three outbreaks in-contacts received 10 c.c. distemper serum and all cases showing a primary temperature rise received approximately 1 c.c. distemper serum per 1 lb. bodyweight.

Among the sporadic cases are included a seven months greyhound from outbreak 2 which showed a recurrence of symptoms one month after recovery from the initial attack and was destroyed as being of insufficient value to warrant treatment, and the Scottie of outbreak 3 which showed a recurrence recently seven days *post partum*; age now 16 months. Her litter was unaffected and continued to suckle throughout. Other cases represented various breeds and mongrels of ages ranging from six months to three years.

Symptoms and Course

In the acute case the first symptoms noticed are an abrupt refusal of food, reluctance to rise or to move—particularly to jump on or off a raised bed—arched back and tucked up appearance. Diarrhoea is at first only blood splashed but later becomes a severe dysentery. A few very acute cases show dysentery at the start.

Examination of an early case reveals a raised temperature (102·5° to 105° F.), congested sclerotic and conjunctivae, acute abdominal pain on palpation and a general muscular hypersensitivity, particularly in the lumbar region. Gingivitis is evidenced at first by a red line about 1/10 in. from the gum margin and a tendency for the margin to bleed on light pressure from the tip of the finger. A few pinhead ulcers may be present in the cheeks but are not constant. Later there is gross ulceration of the gum with a thick brown slime covering the teeth—particularly the cheek teeth, but occasionally also the incisors. Diarrhoea and dysentery become more pronounced, wasting and dehydration are rapid and in the absence of treatment collapse and death occurs in from two to ten days.

Milder cases have been seen in which bleeding gum margins, a small amount of slime on the cheek teeth and diarrhoea without dysentery have been followed by recovery in ten to 14 days after routine treatment.

The chest is not involved unless as a result of coincident infection and respiration is not markedly altered in most cases. In a few, however, increased respiratory rate and a sobbing, mainly costal, respiration has been noticed in the entire absence of *post-mortem* chest abnormality and has been interpreted as evidence of pain in the diaphragmatic area.

Post-mortem Findings

Apart from the mouth lesions, already described, *post-mortem* examination reveals little except bright red and enlarged lymph-nodes throughout the body and a diffuse enteritis. The liver appears congested (in one case the gall bladder was grossly distended) and the kidneys are engorged with blood.

Differential Diagnosis

Leptospirosis.—Vomiting is usually absent in "brown mouth" cases. The early discoloration and dryness of the tongue seen in the uraemic leptospirosis is absent and when later the tongue is covered with brown slime, it is easily wiped off.

The tongue border is never involved in ulceration and both the uraemic and the stuttgart necrosis type of odour are absent, that of "brown mouth" being solely of decomposed blood.

Absence of leptospirosis agglutinins in blood serum has been confirmed.

Treatment

Response to penicillin is spectacular. Early cases showing only the red line on the gum and slight haemorrhage, appear normal within twelve hours of its administration and even those cases showing gross gum ulceration and severe dysentery present a picture of healing gum tissue, cessation of dysentery and return of appetite after 24 hours. Brown slime wiped off the teeth after the first penicillin injection seldom recurs.

Dosage employed in the case of greyhounds was an initial 3 c.c. oily Ca penicillin suspension, 125,000 i.u. per c.c., followed by 2 c.c. every 24 hours for four to five days.

In acute cases an initial 100,000 i.u. Na penicillin was given in addition and injections of the oily suspension were made twelve hourly for the first two days.

The course of the distemper or hard pad if present was not influenced.

Treatment attempted prior to the advent of penicillin had included sulphapyridine, sulphamezathine, phthalyl-sulphathiazole, vitamin C, nicotinamide and injections of vitamin B complex, none of which appeared to exert any influence.

General treatment consisted of demulcents by mouth and injections of glucose and saline to combat the dehydration.

Mortality

Mortality prior to the advent of penicillin was very high, particularly in the kennel outbreak when the condition appeared to assume increased virulence.

Of the seven dogs affected in outbreak 1, none survived although the three dogs showing canine distemper with respiratory symptoms all recovered. Two of the seven deaths were from repeated fits and probably not entirely due to the "brown mouth" syndrome. The kennel hygiene and nursing in this outbreak left a good deal to be desired.

In contrast in the second and third outbreaks in which all cases received penicillin there were no deaths attributable to the "brown mouth" syndrome although in the second outbreak two deaths from distemper occurred. One of these showed no "brown mouth" but died from pneumonia early in the outbreak; the other recovered from "brown mouth" but was destroyed for chorea three weeks later.

Summary and Conclusions

A syndrome characterised mainly by gum necrosis and dysentery has been noted as a complicating factor in canine distemper and

(*Continued at foot of next column*)

Kennel Club Regulations

The Kennel Club will not register or transfer an Irish Setter whose pedigree is unknown or one (or both) of whose parents was unregistered. Before an Irish Setter can be registered:

(1) The owner has to sign a declaration that the dog is not suffering from the disease (*i.e.*, hereditary disease of the eye) and has not produced a case of the disease, *i.e.*, is not a proved "carrier."

(2) The owners of the sire and dam have to sign similar declarations.

Any registrations or transfers are liable to cancellation if a declaration is subsequently proved to be false, *e.g.*, if the dog being registered proves itself to be a "carrier" *after* registration.

NEW INSTRUMENTS AND APPLIANCES

An Apparatus for the Extraction of Fertilised Eggs from the Living Cow

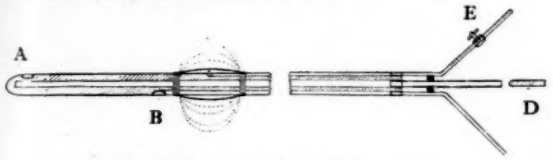
L. E. ROWSON, M.R.C.V.S.,

and

D. F. DOWLING, B.V.SC., B.SC.

With the question of transplantation of ova looming very much to the forefront as a natural development of artificial insemination, the extraction of ova from the living cow becomes a major problem, and the apparatus described in this brief note has been used successfully for this purpose. Although in a very experimental stage, it has been decided to describe the apparatus in order that others working along similar lines may use and develop it.

Collection of fertilised eggs from the Fallopian tubes of slaughtered animals is a relatively simple matter, but in the living animal this is practically impossible, and it is necessary to wait until the ova have passed into the tip of the uterine horn.



A—B. Outlet and inlet of two-way system.
D. Steel stilette.
E. Tap on air system.

The apparatus used for extraction consists of a solid rubber tube some 30 inches long, through which pass three channels. Two of these are used in exactly the same way as a two-way catheter, one opening near the rounded tip of the catheter at "A," and the other a few inches further back at "B." Just behind the second opening of the two-way system a latex collar about 1-inch broad is vulcanised on to the tube at its front and hind edges. Underneath this collar is the opening of the third channel. When air is pumped through this channel by means of a record syringe, the collar becomes inflated all round the catheter rather like an Elizabethan ruffle. This inflated collar acts as a seal completely sealing off the tip of the uterine horn when the tube is in position. At the other end of the catheter the channels are led off at various angles by metal tubes welded together. The metal tube fitted into the channel opening near the tip of the catheter must be straight to allow the introduction of a steel stilette used to hold the catheter rigid during the process of introduction through the cervix. The stilette is removed later in the operation, as will be described. The metal tube leading to the collar is fitted with an airtight tap so that once the collar is inflated the tap can be turned off and the inflation maintained.

Technique

The steel stilette is passed right down the catheter to the tip and, using the rectal technique, the catheter is passed through the cervix, as is done with a normal insemination. Once in the uterine horn, it is pushed forward until the curvature is reached. At this point the stilette is withdrawn slightly and, controlling the tip of the catheter through the rectal wall, it is turned back round the curve and manipulated as far up the tip of the horn as possible by gentle pressure with the external hand and guidance by the hand in the rectum. When in position the collar is inflated, usually with about 15 to 20 c.c. of air, and the tap then turned off to form an airlock. The stilette can now be withdrawn, for the pressure from the collar is sufficient to enable it to get a firm grip on the uterine wall and maintain the catheter in position. The position now obtaining is, therefore, that one has a short conical section of the uterine horn at the distal end of which is the Fallopian tube, and which is blocked at the proximal end by the inflated collar. This section can now be irrigated, using the channels of the two-way system. A certain amount of care is necessary to ensure that the outlet hole does not become blocked and it is advisable to inject the irrigating liquid up first one channel and then the other until a good flow is established. At the same time some degree of massage is carried out through the rectal wall. The injection of 6 c.c. of 2 per cent. Nuvotox, or some similar anaesthetic, epidurally, is a considerable help in controlling the operation. As the irrigating fluid issues from the catheter it is collected in a small beaker. Experience will soon show the pressure necessary in the collar to give a really effective seal, and it is astonishing how effective this is in practice, and almost all the fluid injected can be recovered.

The collection of fertilised ova from the living animal without physical injury, or in any way interfering with the chances of their survival in the uterus of the host cow, is a major problem in the practical implementation of this development to increase the productive capacity of our livestock. It should be remembered that, with this technical equipment improved or perfected, collection of fertilised ova for transplantation still depends on:—

(*a*) Induction of multiple ovulations of fertilisable ova.

(*b*) Use of satisfactory media in which to wash out the ova. The above method enables them to be collected in a small amount of medium.

The apparatus described above has been modified slightly in the light of experience, and is now being manufactured by Messrs. Arnold & Son, 54, Wigmore Street, London.

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hard pad cases and other cases having lowered resistance.

It appears to be infectious and to assume increased infectivity and virulence in kennel outbreaks.

Incidence in pet dogs is sporadic.

Immunity is not conferred by an attack and it appears possible that infection may be carried in a recovered case and flare up in response to lowered resistance, *e.g., post partum.*

The response to penicillin would appear to indicate a bacterial infection, possibly streptococcal. Leptospirosis has been eliminated by serum agglutination tests.

ECONOMIC IMPORTANCE OF PIG DISEASES

At the pig conference held at Harper Adams Agricultural College, Newport, Salop, on March 31st, and sponsored by the British Oil and Cake Mills, Ltd., a resolution was passed urging dollar expenditure on supplementary feeding stuffs.

Dr. Blount said we should not waste dollars on importing maize, for we had our own cereals. Nor did he think we required the amounts of animal protein used pre-war if we watched the amino acid content of the food and saw there was sufficient vitamin B.12.

Mr. H. C. Swann, who spoke on "Pig Diseases," thought their economic importance was not fully appreciated. Losses at weaning were at least two out of every ten, and at least 10 per cent. of carcases at the factories had some part condemned.

We should save much valuable feeding stuff and increase our supplies of bacon if we could reduce unthriftiness. Some losses were due to inherited factors, but too many were due to management and housing.

Few houses were warm enough in winter, so he favoured artificial heating. Many of the Danish pig houses built in this country were virtually death traps for pigs. There was great need for research in building design, and there was no proof that ventilation requirements often quoted were sound. He blamed piglet anaemia and swine influenza as predisposing conditions for many others. Mineral deficiency, he thought, could be largely attributed to a reduction in the use of fish meal.

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NATIONAL AGRICULTURAL ADVISORY SERVICE

The following appointments which take effect on May 1st, 1949, are announced:—

Mr. W. Morley Davies, M.A., B.SC., F.R.I.C., Provincial Director for the East Midland Province of the National Agricultural Advisory Service, has been appointed Senior Education and Advisory Officer to succeed Dr. W. K. Slater, F.R.I.C., who, as already announced, has been appointed Secretary to the Agricultural Research Council in succession to the late Sir John Fryer.

Mr. Arthur Jones, M.A., B.SC., B.LITT., N.A.A.S. Director in Wales, has been appointed Provincial Director for the East Midland Province, and Mr. D. Walters-Davies, B.SC., Deputy Provincial Director, has been appointed N.A.A.S. Director in Wales.

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The Home Secretary has appointed Mr. G. L. Keynes, F.R.C.S., L.R.C.P., to be a member of the advisory committee on the Administration of the Cruelty to Animals Act, 1876, in place of Sir Gordon Gordon-Taylor, who has resigned.

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Corrigenda.—Central Veterinary Society's discussion on Hard Pad Disease (*Vet. Rec.* **61.** 175-178). J. K. Bateman: p. 176, col. 2, line 2, *for* "epidemiological" *read* "epidermal"; p. 178, col. 1, line 13, *for* "vital" *read* "unwise."

ABSTRACTS

[Differentiation of Cattle with *Brucella abortus* Infection Titres and Cattle Vaccinated with *Br. abortus* Strain 19. Venzke, W. G. (1948.) *N. Amer. Vet.* **29.** 484-488.]

The value of S. 19 vaccine in the control of Brucellosis in cattle and the difficulty in differentiating between the blood serum reaction it causes and that arising from natural infection, are discussed in relation particularly to American conditions. Having shown (Dick, J. R., Venzke, W. G., & York, C. *J. Amer. vet. med. Ass.* (1947.) **111.** 255-258) that in vaccinated animals a distinct correlation exists between the whey and blood serum reactions and that the former is largely dependent upon the latter, Venzke discusses in a general way an improved differential test using blood serum in preference to whey as suggested by Traum and Maderious (*Amer. J. vet. Res.* (1947.) **8.** 244-246).

The author made parallel examinations of blood serum and whey on 100 cattle in problem herds using an unspecified rapid plate test. The work was controlled by the necessary bacteriological investigations. The animals were tested twice with an interval of ten days between tests. If the titre remained static or fell, the animals were then subjected to an intramuscular inoculation of 5 c.c. or a test dose of S. 19 vaccine (BA 1). Those showing a rise in titre at the second test (3 per cent. of total) were left and tested later. The animals receiving the test dose were again tested at intervals from six to 17 days thereafter (the twelfth day was found the most suitable) and the titre of reaction determined.

The results indicated that a positive reaction due to vaccination in a previously healthy animal is shown by a rise of at least a full dilution in titre at the test following the test dose of S. 19 vaccine (*i.e.*, an animal having a static serum titre of 1:100 should give a positive titre of 1:200 at least after the test dose of S. 19 vaccine). The theoretical explanation put forward for this is that in an animal with a well-established infection, a point of antigen saturation is reached beyond which there is a very refractory antibody response.

Venzke suggests that with such a differential test available, a vaccination policy might be combined with the test and slaughter policy of the Federal Authorities.

(*Abstractor's Note.*—The need for such a differential test is often great and the method employed by Venzke seems worthy of confirmation by carefully controlled observations.)

W. T. R.

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[Brucella Chemotherapy: I.—Studies of the Effect of Para-Aminobenzoic Acid on Brucella *in vitro*; II.—Para-Aminobenzoic Acid in the Treatment of Experimental Brucellosis in Guinea-pigs. Cotton, C. M., & Swope, R. E. (1948.) *Amer. J. vet. Res.* **9.** 164 and 169.]

I.—The authors describe experiments to test the *in vitro* effect of Para-Aminobenzoic acid (P.A.B.A.) and its sodium salt (Na. P.A.B.A.) on Brucella—two strains each of *Brucella abortus, Brucella suis* and *Brucella melitensis* being used. Nine concentrations of the drug ranging from 3 to 20 mg. per c.c. were employed. The fluid media used were: distilled water, tryptose broth and blood from cow, horse, sheep, hog and man. Transfers from all tubes were made daily on to tryptose agar.

Two mg./c.c. of para-aminobenzoic acid completely inhibited growth of *Br. melitensis, Br. suis* and *Br. abortus* on tryptose agar, while 5 mg./c.c. was required to produce complete inhibition with the sodium salt of P.A.B.A. Lower concentrations did not result in complete inhibition, but 1 mg./c.c. slowed the growth of organisms. Using animal blood, a large percentage of cultures treated with P.A.B.A. or Na. P.A.B.A. were negative in six to 35 days. All three species of Brucella suspended in distilled water were killed in all concentrations of the drug from 3 to 20 mg./c.c. within 18 hours. The sodium salt affected the organisms more slowly. Death times were greatly lengthened in tryptose broth over those in distilled water. In all blood the sodium salt was more effective than the acid. Seven tables are given to show average death rate of Brucella in these various media treated with P.A.B.A.

II.—The authors describe a series of experiments in which groups of five guinea-pigs receiving an infective dose of 1½ billion virulent bovine Brucella organisms, intraperitoneally, were treated with courses of four-hourly subcutaneous injections of solutions of the sodium salt of para-aminobenzoic acid. Groups were treated as follows:—

(*a*) Drug treatment for 72 hours before administration of the infective dose.

(*b*) Drug treatment commenced at same time as injections of infective dose.

(*c*) Infective dose 72 hours before treatment.

(*d*) Infective dose two weeks before treatment.

In these experiments treatment extended to ten to 21 days. It was found that subcutaneous doses of a 5 per cent. solution of Na. P.A.B.A. given four-hourly for 21 days produced sterilisation in 100 per cent. of animals when treatment was begun three days after the infective organisms were injected. Where treatment was delayed for two weeks after infection, 80 per cent. of animals were negative to cultural examinations of spleen, liver, kidney, heart, lungs and reproductive organs.

Injections of the drug occasionally produced death from shock in the early stages of the experiments, but in general the treated animals showed rapid gains in weight as treatment progressed.

Blood levels of the drug ranged from 15 to 45 mg./100 c.c. Tests of blood levels in normal untreated guinea-pigs gave varying reactions, as there appeared to be a substance present which gave a similar colour reaction to P.A.B.A. Brucella organisms isolated from treated animals showed considerable change in colonial appearance.

J. M.

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[Comparative Fasciolicidal Efficacy of Hexachlorethane and Carbon Tetrachloride in Animals. Olsen, O. W. (1948.) *Vet. Med.* **43.** 367-370.]

Ten sheep infested with *Fasciola hepatica* were divided into two groups of five. In one group, each sheep was dosed with 15 grammes of hexachlorethane, in a Bentonite suspension. The animals in the other group each received 1 c.c. of carbon tetrachloride, administered in a gelatine capsule.

The results were based on the numbers of flukes collected from the faeces and, when the animals were slaughtered three to six days after the administration of the drugs, from the livers and intestines. Counts of the living and dead flukes revealed that an average of 91 per cent. of flukes were destroyed by both the anthelmintics.

In one sheep in each group a substantial number of flukes remained alive. In this case carbon tetrachloride only achieved 58 per cent. eradication, and hexachlorethane 68 per cent.; in the latter instance the gall bladder had undergone extensive pathological malformation but no marked abnormality was apparent in the case of carbon tetrachloride failure.

Although the maximum lethal effect occurred sooner with the carbon tetrachloride than with the hexachlorethane, dead flukes were recovered 19 hours after medication in both groups.

D. W. J.

REVIEW

[University of Cambridge School of Agriculture: Memoir No. 20. (1949.) Price 2s., post free.]

This contains a summary of the papers published by the members of the staff of the School of Agriculture and its associated research institutes during the year ended October, 1948. The papers are numerous and diverse and space allows of mention of only a few points.

Controlled experiments have indicated the value of dried grass meal for fattening pigs, provided that it replaces rather less than 33 per cent. of the normal ration. It was fed, together with other meals and water, to the consistency of a "thick slop," thereby requiring less energy for ingestion and mastication than fresh grass. Pigs receiving 33 per cent. of their ration in the form of dried grass meal made slightly leaner, though satisfactory, carcases, with a tendency in some cases for the fat to be slightly yellowish as a result of carotene storage.

From a survey of the experiments made on Endocrine Balance in Relation to Fertility and Sterility, it was concluded that "the balance between the follicle stimulating hormone and luteinising hormone secretions of the anterior pituitary gland, and between the oestrogens and progesterones from the ovary, plays an important part in regulating fertility and sterility in farm animals. This balance varies in different species so that some, such as the horse, are more prone to deficiencies in L.H. and progesterone than others, such as cattle, which are more prone to deficiencies in F.S.H. and oestrogen. The effectiveness of treatment with hormones in different species varies in the same way; L.H. and progesterones are most effective with horses, and F.S.H. and oestrogens with cattle. This applies also to treatment for specific uterine infections such as trichomonas in cows. . . . The mechanism of multiple ovulations and the development or failure of development, of the resulting fertilised ova also probably depend on this balance."

Other papers deal with the relation of nutrition to the growth of lambs before and after parturition.

G. P. W.

REPORT

[Milk Services in Scotland (Department of Agriculture for Scotland: Department of Health for Scotland, 1949). Report of Committee (J. R. Philip, K.C., Chairman). Edinburgh: H.M. Stationery Office, 6d. net.]

On March 25th there was issued the report of the Committee appointed by the Secretary of State for Scotland with the following terms of reference:—

> "To review the services at present in operation in Scotland in connection with the production of milk and the quality of the supply, and to consider and report what improvements in these services are desirable and practicable."

The first chairman of the Committee was Mr. John Wheatley, K.C., now Lord Advocate, who resigned on becoming Solicitor-General for Scotland. He was succeeded in May, 1947, by Mr. J. R. Philip, K.C. Other members of the Committee were: Sir Robert Nimmo, Mr. John Rennie, Mr. G. P. Laidlaw, Dr. May Baird, Mr. John Dunlop, and Miss P. L. Wingfield.

Among those submitting evidence were Government departments, local authorities, professional organisations (including the National Veterinary Medical Association of Great Britain and Ireland), Agricultural colleges and research institutes, organisations of producers and distributors, and the Ayrshire Cattle Herd Book Society.

The recommendations include the proposal that the veterinary service in Scotland of the Animal Health Division of the Ministry of Agriculture should be transferred to the Department of Agriculture for Scotland.

The Committee also recommend that the Secretary of State, through the Department of Agriculture, should be responsible in place of local public health authorities for supervision of milk production up to the stage of delivery to the first buyer, but subject to the public health authorities retaining their powers and duties in relation to milk-borne diseases and diseases affecting dairy personnel.

The Committee say there would appear to be a strong case for a reduction in the number of visiting officials so as at least to avoid overlapping, and also for the co-ordination of such officials as remain, so far as possible, under one central authority.

The position of the sanitary inspector of the local authority, as the official in practice supervising milk production, is discussed, and the Committee point out that the proposed separate Scottish service under the Department of Agriculture for Scotland would permit of the utilisation of the services of veterinary officers as the officials in charge of the general supervision of milk production in connection with the recommendations made later in their Report.

Milk distribution, in the sense of all services between the stages of delivery to their first buyer and delivery to the ultimate consumer, should continue to be supervised by local authorities, subject to a recommendation that the Secretary of State, through the Department of Health, should not merely have power to confirm by-laws relating to distributors but also an overriding power to enforce them where necessary.

Under the Committee's proposals Agricultural Executive Committees would be responsible for the registration of producers' premises for the enforcement of dairy by-laws or regulations in relation to producers and for the issue of licences for designated milk.

Dairy by-laws or regulations affecting producers' premises should be issued by the Department of Agriculture, who should also maintain in each area a staff of milk production officers and should strengthen and develop the advisory service based on the county extension service of the agricultural colleges.

The Committee also considered the case where the farmer is both producer and distributor. They recommend here that production should be regarded as ending at the farm gate, and up to that point the authority would, in general, be exercised by the Department of Agriculture. Beyond the farm gate the public health authorities would have control, and their power to make routine milk-tests should extend to the farm premises.

With regard to bovine tuberculosis, the Committee suggest that areas largely free from disease should be scheduled by the Animal Health Division, that thereafter for two years free testing should be offered to farmers to allow them to bring their herds to attested standard; and that on the expiry of that period remaining herds should be tested compulsorily and reactors slaughtered. It is also recommended that in all areas the cows of exempted producers should be subject to regular inspection by the Animal Health Division and such inspections should, as far as practicable, ultimately be included in any national milk testing scheme. Vaccination of young females in dairy herds against contagious abortion should be further encouraged, but only on a voluntary basis.

There was general agreement amongst the Committee that there are at present too many special designations for milk and that they should eventually be reduced to not more than three: (1) Certified, (2) Tuberculin-tested, (3) Pasteurised. Steps should be taken to familiarise the public with the significance of these designations.

QUESTIONS IN PARLIAMENT

Cruelty to Animals (Committee)

Major Tufton Beamish (Mar. 31st) asked the Secretary of State for the Home Department whether he is now in a position to announce the terms of reference of the committee to be set up to enquire into alleged cruelty to animals.

Mr. Ede: Not yet, Sir, but I hope to be in a position to make a statement in the near future.

Major Beamish: May I ask the Home Secretary by whom the terms of reference will be drafted, and whether this House will have an opportunity of debating them before a final decision is taken?

Mr. Ede: I am drafting the terms of reference and they will be reported to the House.

Major Beamish: May I further ask the Home Secretary, bearing in mind the great importance of keeping these terms of reference as wide as possible, if he can say, for example, whether there will be enquiry into alleged cruelty to fish?

Mr. Ede: No, Sir. I think it is desirable that these terms of reference should be such that a report can be made and submitted to the House in a reasonably short space of time.

. . . . . .

Veterinary Surgeons, Wales

Mr. Watkins (Mar. 28th) asked the Minister of Agriculture how many veterinary surgeons are located in each of the counties in Wales; and what is the percentage of farms and holdings covered.

The Minister of Agriculture (Mr. Thomas Williams): As the reply to the first part involves a table of figures I will, with permission, circulate it in the Official Report. I am not aware that any farmers in Wales are unable to obtain the services of a veterinary surgeon.

Mr. Harold Davies: Does not my right hon. Friend think the time has now come to review entirely the National Veterinary Service, and will he get into consultation——

Mr. Speaker: That is another question; this Question only asks how many veterinary surgeons there are in Wales.

Following is the table:

Number of practising veterinary surgeons resident in each county in Wales (including Monmouth):

Anglesey	6
Brecon	4
Caernarvon	9
Cardigan	13
Carmarthen	26
Denbigh	18
Flint	7
Glamorgan	37
Merioneth	4
Monmouth	10
Montgomery	10
Pembroke	13
Radnor	1
Total	158

In addition to those in private practice, there are 48 veterinary surgeons in Wales, including 44 in the Ministry's service, holding full-time veterinary appointments.

. . . . . .

Dairy Cattle (Tuberculin Test)

Mr. Thornton-Kemsley (Mar. 28th) asked the Minister of Agriculture if he will estimate the amount which would be required in each of the next three years to purchase at killing-out prices all dairy cattle found to react to the tuberculin test, less the carcase value of such reactors.

Mr. T. Williams: If the hon. Member has in mind the testing of all dairy cattle over the next three years and the compulsory slaughter of all reactors, that would not be practicable for several reasons, including the effect on milk supplies and on the dairy farming industry. I have therefore not tried to make an estimate, but the difference between killing-out value and carcase value of reactors would be relatively small, since only a small proportion of carcases or parts of carcases would be likely to be condemned.

Tuberculous Carcases

Mr. Hastings asked the Minister of Food what percentage of cattle slaughtered for human consumption in England and Wales was found on inspection of the carcases to be infected with tuberculosis during each of the years 1941-48.

Mr. Strachey: I regret that, for the reasons given in reply to my hon. Friend the Member for Newport (Mr. Peter Freeman) on March 4th, I am unable to indicate the percentage of carcases of home killed beef condemned on account of infection by tuberculosis.

. . . . . .

Meat (Unhygienic Display)

Mr. Hector Hughes (Mar. 21st) asked the Minister of Food whether, in view of the unhygienic nature of the practice of meat being exposed in open-fronted butchers' shops, he will order the discontinuance of this practice.

Mr. Strachey: No. This would not be practicable at the present time.

. . . . . .

Ewes (Slaughter)

Lieut.-Col. Sir Thomas Moore (Mar. 21st) asked the Minister of Food to state his policy in regard to the slaughter of sheep while in lamb.

The Minister of Food (Mr. Strachey): The graders are required by a standing instruction not to accept for purchase any sheep which, in their opinion, is in lamb unless it is necessary or desirable that the animal should be taken for immediate slaughter under the casualty arrangements. The attention of all the graders has been drawn to this instruction and they have been reminded of the need to exercise the utmost care in the examination of all ewes.

. . . . . .

Milk Substitute (Experiments)

Mr. Baker White (Mar. 21st) asked the Lord President of the Council if he will make a statement on the results of the experiments being carried out under his auspices at Cambridge University, designed to produce milk from wheat.

Mr. H. Morrison: No such experiments have been carried out at Cambridge, but I believe that the question refers to observations recently made in Germany by workers for the Medical Research Council who are based on Cambridge. They have shown that a mixture including soya flour, wheat and other cereals, to which only a small proportion of dried milk is added, promises to be a useful substitute for dried milk itself in the nutrition of children. This, of course, is a very different thing from producing milk from wheat.

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Purchase Tax (Vaccines)

Mr. Erroll (Mar. 22nd) asked the Chancellor of the Exchequer whether he is aware that under head IV of the Purchase Tax (No. 5) Order, 1948, vaccines have been exempted from Purchase Tax so long as they are prepared for use by injection or by application to the scarified skin of the user, but that vaccines are chargeable with Purchase Tax if intended for oral administration; and whether, in view of the fact that there is a growing body of favourable opinion towards the latter form of therapy, steps can be taken to ensure that vaccines for oral administration are placed in the same position as other vaccines so far as Purchase Tax is concerned.

The Economic Secretary to the Treasury (Mr. Douglas Jay): The trade organisation most concerned has already been informed that vaccines for oral administration will be considered when the next Treasury Exemptions Order is being prepared.

GRASS CONFERENCE

On May 25th the Minister of Agriculture will open a national two-day conference at Church House, Westminster, entitled "Grass, Britain's Most Important Crop." Organised by the N.F.U., it will deal with production, conservation and feeding.

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Weekly Wisdom

". . . To what then can ethics as a science cling?

"To this question the peculiar meaning of the 'practical' in ethics corresponds. Other domains of practical knowledge are always aware through other sources what in the last resort the goal is. In all technique, hygiene, jurisprudence, pedagogy, the ends are fixed, are presupposed; there is only a question as to ways and means. Ethics is practical in a different sense, one might almost say in the reverse sense. . . ."—Hartman's *Ethics*, **1**, 33.

NOTES AND NEWS

Diary of Events

Apr. 12th.—Central Veterinary Society: One-day Poultry Course at the Royal Veterinary College, commencing at 10.30 a.m.

Apr. 12th.—Scientific Meeting of the Zoological Society of London, Regent's Park, N.W., 5 p.m.

Apr. 13th.—Meeting of the Comparative Section of the Royal Society of Medicine, at 1, Wimpole St., W.1, 5 p.m.

Apr. 20th.—Special Meeting of the Society of Women Veterinary Surgeons Division, N.V.M.A., at the Royal Veterinary College, London, N.W.1., 7.30 p.m.

Apr. 20th.—Meeting of the Lincolnshire and District Division, N.V.M.A., at Peterborough (Grand Hotel), 2.15 p.m.

Apr. 20th, 21st and 22nd.—Quarterly Meetings of Committees and Council, N.V.M.A., in London (Meeting of Council, April 22nd).

Apr. 21st.—Extraordinary General Meeting of the Royal Counties Division, N.V.M.A., at the Geology Lecture Theatre, The University, Reading, 4 p.m. (Note change in time of meeting.)

Apr. 21st.—Annual Race for the R.A.V.C. Point-to-Point Challenge Cup, at Melton Mowbray (Quorn Hunt Meeting).

Apr. 21st.—Meeting of the Association of Veterinary Teachers and Research Workers, at the Royal Veterinary College, London, N.W.1, 11 a.m.

Apr. 23rd.—Association of State Veterinary Officers: Annual Meeting at the Royal Veterinary College, Camden Town, 2 p.m.; Annual Dinner at the Criterion Restaurant, Piccadilly, 6.30 p.m.

Apr. 27th.—Meeting of the Mid-West Division, N.V.M.A., at Bristol (Berkeley Café, Clifton), 2.15 p.m.

Apr. 27th.—Meeting of the East Midlands Division, N.V.M.A., at Sutton Bonington, 2.15 p.m.

Apr. 27th.—Meeting of the Southern Counties Division, N.V.M.A., at Southampton (Polygon Hotel), 6 p.m.

Apr. 28th.—Special Meeting of the Central Veterinary Society at the Royal Veterinary College, Camden Town, 2 p.m.

Apr. 28th.—Meeting of the South-Eastern Division, N.V.M.A., at Tunbridge Wells (Mount Ephraim Hotel), 2.30 p.m.

May 3rd.—R.C.V.S. Animal Management Examination tour, commencing with London.

May 16th.—R.C.V.S. Pharmacology, etc., Examination (Revised Syl'abus). Written, 10 to 12 noon, at appropriate Colleges.

May 16th.—Annual Meeting of the R.A.V.C. Golfing Society, at North Hants Golf Club, Fleet, 10 a.m.

June 1st (Wednesday).—Annual General Meeting of the Royal College of Veterinary Surgeons.

June 1st, 2nd and 3rd.—Quarterly Meetings of Council, R.C.V.S.

June 7th and 8th.—D.V.S.M. Written Examination, Royal (Dick) Veterinary College, Edinburgh.

June 23rd and 24th.—R.C.V.S. Membership Written Examination.

Aug. 8th to 13th.—Fourteenth International Veterinary Congress, Central Hall, Westminster, and Church House, Westminster, London, S.W.1.

Aug. 12th to 15th.—Sixty-seventh Annual General Meeting and Congress, N.V.M.A., in London.

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Export and Slaughter of Horses

Committee's Terms of Reference

In the House of Commons on Monday last Mr. Tom Williams, Minister of Agriculture, announced the terms of reference of the committee to enquire into the export and slaughter of horses. He said that Lord Rosebery had consented to be chairman of the committee, the other members of which would be announced later.

The committee is to enquire into (1) the extent of the export trade in horses for (*a*) work and (*b*) slaughter, and the considerations affecting the continuance of the trade for either purpose; (2) the extent of the practice of slaughtering horses for food for human and animal consumption in this country and the considerations affecting the continuance of the practice; (3) the effect of the export and slaughter of horses on the supply of working horses

in this country; (4) the desirability or otherwise of encouraging the breeding of horses for slaughter; (5) the statutory provisions designed to prevent unnecessary suffering by horses while being transported by air, rail, road, or sea and in the slaughterhouses, whether such provisions are adequate, and whether they are properly enforced; and to make recommendations.

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PERSONAL

Mr. R. E. Glover's Appointment to the Chair of Veterinary Pathology in the University of Liverpool

We have pleasure in announcing that at the meeting of the Senate of the University of Liverpool held on March 23rd, Mr. Ronald Everett Glover, M.A. (CANTAB.), B.SC. (VET. SCI.) (LOND.), F.R.C.V.S., was appointed to the newly created Chair of Veterinary Pathology. It is an appointment which will be welcomed warmly by his colleagues, although the translation of Mr. and Mrs. Glover to Liverpool, when the professorial post is taken up in October, will be much regretted by their many friends in the South.

In his new sphere Mr. Glover will continue the career as a veterinary research worker which has earned him distinction, as recorded in the biography published in our columns at the time (1937) he left the Institute of Animal Pathology at Cambridge, at the call of the Medical Research Council, to succeed the late Major G. W. Dunkin (on the latter's departure for the A.R.C. Field Station at Compton) as Superintendent of the Farm Laboratories of the National Institute for Medical Research at Mill Hill. Two years ago Mr. Glover became the first Director of the Laboratory Animals Bureau, a Medical Research Council unit. Since that record was published, Mr. Glover has continued his valued work as a member of the profession in many capacities. He has had two periods of service as a member of Council, R.C.V.S., and has represented the Veterinary Research Club as a member of Council, N.V.M.A., of whose Editorial Committee he was a notably successful Chairman in 1946-47; during the following year he was President of the Section of Comparative Medicine of the Royal Society of Medicine, to which Section he also rendered yeoman service as Hon. Secretary.

It is of interest to recall that the first veterinary chair in the University of Liverpool was held by Dr. J. T. Share Jones in the subject of anatomy, while he was Director of Veterinary Studies in the School. On his resignation (Emeritus Professor, 1939) he was succeeded by John G. Wright as Professor of Veterinary Surgery. On the death of Professor J. F. Craig in 1943, the William Prescott Chair of the Care of Animals—Causation and Prevention of Disease—first held by the late Professor S. H. Gaiger, fell vacant, and remains so.

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Births.—BOWDITCH.—On March 25th, 1949, at Windsor, to Sheila (*née* Scott) M.R.C.V.S., wife of Edmund Bowditch, M.R.C.V.S.—a son.

JUKES.—On March 21st, 1949, to Sylvia Jennie (*née* Langton), wife of A. W. Jukes, M.R.C.V.S., of Lyndene, Station Road, Baschurch, Salop—a son.

LITTLEWOOD.—On March 24th, 1949, at Ibadan, Nigeria, to Margaret, wife of Hugh K. Littlewood, M.R.C.V.S., Colonial Veterinary Service, a daughter, Carolyn Elizabeth.

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Marriage.—JACKSON—HALL.—On March 29th, 1949, at St. Mary's, Bolton-on-Swale, Yorkshire, Oliphant Fairburn Jackson to Elizabeth Katharine Marion Hall (Buss) second daughter of Colonel L. R. Hall of "The Lodge," Scorton, Yorkshire. Mr. Derek W. Young was the best man. Both parties, as well as the best man, are third year students at the Royal (Dick) Veterinary College, Edinburgh.

. . . . . .

Forthcoming Marriage.—PRESCOTT—SLEIGH.—The engagement is announced between John Graham, elder son of Mr. and Mrs. J. Prescott, "Kenmore," Bowlacre Road, Hyde, Cheshire, and Anne Kilpatrick, elder daughter of Mr. and Mrs. A. Sleigh, Mains of Tolquhon, Tarves, Aberdeenshire.

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Capt. A. A. Abbott.—Would Capt. A. A. Abbott who wrote a letter to the Registrar of the Royal College of Veterinary Surgeons from Cleethorpes postmarked "Queens Parade, March 29th," please communicate his address, which was not given in the letter, to the Registrar: otherwise no action can be taken on this letter nor on the previous letter postmarked Chepstow, January 12th, 1948, also containing no address.

R.C.V.S. OBITUARY

OXSPRING, George Ernest, O.B.E., F.R.C.V.S., Major R.A.V.C. (retd.), Barrow Hill House, Ashford, Kent. Graduated London, July 7th, 1915; Fellowship October 4th, 1935. Died April 5th, 1949.

It is with deep regret that we record the death of Major Oxspring, who succumbed to a heart attack on Tuesday evening last. Further reference will be made in an early issue.

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B.M.A. GUILD FOR COLLECTIVE ACTION IN DISPUTES

At a meeting of the representative body of the British Medical Association held in London on March 30th, it was decided to form a central organisation to be known as the British Medical Guild, to allow greater freedom of action in collective bargaining, and to provide compensation to practitioners who suffer financial hardship through participation in such action.

The new organisation will be administered by a board of trustees, who will be separately appointed, but will be members of the present B.M.A. general council, and its policy in effect will be dictated by the representative body of the B.M.A. This move will provide doctors with a body for collective action of a kind from which the B.M.A. is at present precluded by its memorandum of association as a limited liability company.

The representative body spent all day debating whether to form the guild or to create a trade union organisation as a parallel body. Much time was also spent on an amendment which declared that the B.M.A. as at present constituted was competent to undertake any necessary negotiations on behalf of the profession, and that the proposed guild should be abandoned. This amendment was heavily defeated.

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INTERNATIONAL CONGRESS ON ANIMAL HUSBANDRY

"The discussions which have been going on more intensely for the last year or two on the relative values of records and conformation as guides to production will find a focus at Paris next November," writes H. R. Davidson in *The Farmer and Stock-Breeder*, and continues: "An International Congress on Animal Husbandry is to be held there, and the indications are that it will attract a considerable number of livestock enthusiasts.

"Preliminary arrangements have just been concluded in Paris when a group of delegates from seven or eight European countries met to discuss the programme. In spite of increased political difficulties, there will be a representative collection of papers.

"There are to be four main subjects: the standardisation of different systems of valuing feeding stuffs; how best to select animals for breeding; artificial insemination; and the economics of animal production.

"It is the second that will be of outstanding interest to all who are concerned with livestock breeding. At the preparatory meeting it was suggested that some of the countries (for example, Denmark, England and America) were of the opinion that milk records alone were sufficient while the others paid more attention to conformation. But an international meeting of this nature should help to clear the air. In view of the accessibility of Paris this is a good opportunity for British interest of all kinds to be well represented."

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RABIES IN AN IMPORTED DOG

Since the end of the war there have been eight cases of rabies among dogs imported into Great Britain from abroad. In the latest case the animal, a Bull Terrier bitch, aged five years, appeared to be in normal health upon arrival in this country from Burma on February 8th, 1949. After five weeks in quarantine the dog appeared "off colour," and symptoms suggesting rabies were seen on the following day. These symptoms became daily more pronounced until the dog's death on March 22nd, 1949.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

FOOT-AND-MOUTH DISEASE:

Isle of Ely.—Catlings Lane Farm, Four Gotes, Tydd St. Giles, Wisbech (March 30th).

Lincs. (Holland).—170, Guy's Head Road, Sutton Bridge, Lincs. (April 2nd).

SHEEP SCAB:

Lancs.—Knarr End Farm, Blacklane End, Colne (March 29th); Cattle Breeding Centre, Mitton Road, Whalley, Blackburn (March 30th).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents are requested to write as briefly as possible.

ECTOPIC LIVER LOBES

Sir,—I can recall a case similar to that recorded by Mr. J. G. Speed in your issue **61.** 12. 150-151—An Ectopic (Intrapericardial) Lobe of the Liver in a Cat—but in this instance the animal was a dog and the ectopic liver lobe, although adherent by its covering to the parietal reflection of pericardium, appeared to be in the caval fold of the mediastinum.

It occurs to me that in my case the lobe might have been enclosed in the pneumato-enteric recess, which develops between the fore gut (oesophagus) and the posterior vena cava before the definitive reflections of pericardium, pleura and peritoneum are established. Later, with closure of the diaphragm by the ingrowing pleuro-peritoneal folds, this recess is separated into the infra-cardiac bursa within the thorax and the superior (anterior) recess of the omental bursa within the abdomen. The lobe would thus be in the infra-cardiac bursa in the mediastinal cavity, and the point of passage of the peduncle through the diaphragm at or near the junction of the right pleuro-peritoneal fold with the septum transversum.

Yours faithfully,

C. W. Ottaway.

University of Cambridge,
Department of Zoology,
Downing Street, Cambridge.
March 29th, 1949.

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NIGHT VETERINARY SERVICES IN THE METROPOLITAN AREA

Sir,—In reply to Major Hancock's letter in your issue of March 10th, a sub-committee of the Central Veterinary Society presented, in December, 1947, a report which was adopted by this Society and which has recently been received.

The substance of this report is given below.

Yours faithfully,

F. Knight,
General Secretary, N.V.M.A.

. . . . . .

The Alleged Difficulty in Obtaining the Services of a Veterinary Surgeon in Emergency at Night

Veterinary surgeons in towns are normally prepared to deal with true emergency cases at any hour. There is a growing reluctance on the part of many, however, to respond to all the requests—made by small-animal owners—for attendance at night, particularly when the request is made by someone who is not a client. The majority of these night calls are from strangers, many of whom seek the aid of veterinary surgeons in private practice only after working hours, when the places to which they usually take their animals are closed. Moreover, many of these cases are not genuine emergencies at all, and the owners are fully aware of the fact.

A large, apparently growing, section of the public shows a lack of consideration for the veterinary surgeon in practice who needs rest and leisure, after the day's work is done, like anybody else. In addition, it must be said that many owners resort to subterfuge, and will go to any lengths, to obtain professional aid at unreasonable hours, merely to suit their own convenience or to cover up their own neglect.

Many wily persons assume that if they go to a police station and ask the police to telephone for a veterinary surgeon, the latter will be deluded into thinking that it is a genuine emergency call and, in any case, dare not refuse a police call; or they will first call at a police station, ostensibly to enquire the address of the veterinary surgeon, and then call at the latter's office and say, "He *must* come—*the police* sent us." Other unscrupulous owners seek to turn the professional ethics of the practitioner to their own advantage; although they themselves may have neglected to seek professional advice for hours or days after this became necessary, they feel that the veterinary surgeon dare not refuse treatment at any hour. Instances are not uncommon where an animal-owner, aggrieved at not obtaining assistance sought at an unreasonable time, has actually threatened to invoke the aid of one of the animal welfare bodies against the veterinary surgeon. It is an amazing fact that such threats are made by persons who have already sought assistance at an animal clinic and have accepted calmly the pronouncement or discovery that the clinic is closed.

Many clinics advertise widely their "humane services," but these for the most part fade out after early evening and on Sundays and public holidays, when the veterinary surgeon in private practice, unsubsidised, is expected to respond to any plea of urgency, however fictitious. Most clinics appear to be strangely free from any such moral obligation, real or implied.

Recommendations for encouraging a more ready response to night calls:—

(*i*) Propaganda of a widespread and persistent nature to educate the public (*a*) in its responsibility for seeking the aid of skilled attention at the first signs of necessity, in the interests of the animal; (*b*) in showing consideration for the veterinary surgeon whose help is sought. Conscientious practitioners usually arrange to be within call at times other than those of ordinary routine practice, as a matter of loyalty to their regular clients. It must be accepted that they cannot reasonably be readily available during all the 24 hours. If, after some experience of the duplicity of a selfish section of the public they decline to hasten to alleged emergencies without careful sifting of their genuineness, they cannot be blamed.

(*ii*) Clinics employing whole-time professional staff should make provision for at least some proportion of night service to be undertaken by their own staff. The night staff of the R.S.P.C.A. should be more cognisant of the area in which practitioners normally function, and should also make more searching enquiries as to the validity of emergency calls before summoning a veterinary surgeon or telling the owner his name and address, and enquire as to whether the owner has attempted to obtain the services of his regular (or local) veterinary surgeon. If it is then apparent that the person seeking service is not faced with an emergency, service should be withheld.

"Next."

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DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange*	Sheep Scab	Swine Fever
Mar. 1st to 15th, 1949	6	1	14	—	8	—
Corresponding period in—						
1948	4	—	34	—	2	2
1947	5	14	1	—	—	—
1946	5	1	—	—	9	21
Jan. 1st to Mar. 15th, 1949	34	6	101	—	21	4
Corresponding period in—						
1948	25	—	129	1	18	7
1947	15	77	2	1	13	10
1946	26	18	—	4	33	133

Note.—The figures for the current year are approximate only.

* Excluding outbreaks in Army Horses.